



BUREAU OF
RESEARCH, INNOVATION,
& INFORMATION TRANSFER

New Jersey Department of Transportation
26th Annual NJDOT Research Showcase

Pathways to Sustainability

NEW JERSEY DEPARTMENT OF TRANSPORTATION

26TH ANNUAL NJDOT
**RESEARCH
SHOWCASE**

OCTOBER 23, 2024

Conference Center at Mercer
1200 Old Trenton Road
West Windsor, NJ 08550

26TH ANNUAL NJDOT RESEARCH SHOWCASE

The Annual New Jersey Department of Transportation (NJDOT) Research Showcase is an opportunity for New Jersey’s transportation community to experience the broad scope of ongoing academic research initiatives and share technology transfer activities being conducted by institutions of higher education partners and their associates. It also serves to highlight the benefits of transportation research, including NJDOT’s own program. As part of the event, the annual implementation award and recognition of outstanding university students studying transportation will be presented.

This program is organized by the NJDOT Bureau of Research, Innovation & Information Transfer in partnership with the Rutgers Center for Advanced Infrastructure and Transportation (CAIT). It meets requirements for up to 2 professional development hours (PDHs) for continuing professional competency for licensed professional engineers.** AICP credit is under review. The 26th Annual Research Showcase is sponsored by the Federal Highway Administration and the New Jersey Department of Transportation.

AGENDA

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| 9:30 a.m. | Introduction and Housekeeping David Maruca, Program Development Administrator, Rutgers Center for Advanced Infrastructure and Transportation |
| 9:40 a.m. | Welcoming Remarks Eric Powers, Assistant Commissioner Statewide Planning, Safety and Capital Investment, New Jersey Department of Transportation |
| 9:45 a.m. | Opening Remarks Francis “Fran” O’Connor, Commissioner, New Jersey Department of Transportation |
| 9:55 a.m. | Opening Remarks Sutapa Bandyopadhyay, Planning and Program Development Manager, Federal Highway Administration - New Jersey Division |
| 10:00 a.m. | Keynote Address Jim Tymon, Executive Director, American Association of State Highway and Transportation Officials |
| 10:40 a.m. | Break |
| 10:50 a.m. | Panel Discussion: How is NJDOT creating pathways to sustainability? Alex Borovskis, Director Construction and Materials Robert Blight, Executive Manager Pavement & Drainage Management and Technology Bureau Krishna Tripathi, Project Management Specialist 3, Project Management Mohab Hussein, Supervising Engineer, Bureau of Structural Design & Geotechnical Engineering Sushant Darji, Principal Engineer Planning, Bureau of Statewide Strategies Giri Ventikeela, Innovation Officer, Bureau of Research, Innovation & Information Transfer |
| 11:45 a.m. | Presentation of 2024 Awards Pragna Shah, Acting Manager, Bureau of Research, Innovation and Information Transfer New Jersey Department of Transportation 2024 Outstanding University Student in Transportation Research Award 2024 NJDOT Research Implementation Award 2024 Best Poster Award 2024 Research Champion Award 2024 NJDOT Build a Better Mousetrap Award 2024 National High Value Research Award |
| 12:00 p.m. | Buffet Lunch/Break |

CONCURRENT BREAKOUT SESSIONS

Presenters selected from abstract solicitation by NJDOT

1:00 p.m.

Concurrent Breakout Sessions

1:10 - 1:30 p.m.

INFRASTRUCTURE Room: Auditorium | Moderator: Shane Mott, Rutgers CAIT
Evaluation of Performance of Bridge Deck with UHPC and LMC Overlays through Accelerated Testing. Presenter: Nenad Gucunski, Rutgers University

SUSTAINABILITY Room: 213 | Moderator: Omid Sarmad, Rutgers CAIT
How Concrete is Becoming a Carbon Sponge
Presenters: Mohamed Maghoub and Mohab Hussein, NJIT

SAFETY Room: 214/215 | Moderator: Ryan Stiesi, Rutgers CAIT
Towards UAS-based Real-time Video Streaming and Data Analytics for Estimating Highway Traffic Flow Characteristics. Presenter: Meiyin Liu, Rutgers University

POSTER SESSION Room: 116/117

1:40 - 2:00 p.m.

INFRASTRUCTURE Room: Auditorium | Moderator: Shane Mott, Rutgers CAIT Complex
Simulation of Large Ship Impacts on Bridges.
Presenter: Anil Agrawal, City College of New York

SUSTAINABILITY Room: 213 | Moderator: Omid Sarmad, Rutgers CAIT
Development of Pavement Design Procedures and Construction Specifications for Cold Central Plant Recycling Asphalt Mixtures. Presenter: Abhary Eleyedath, Rowan University

SAFETY Room: 214/215 | Moderator: Ryan Stiesi, Rutgers CAIT
Enhancing Vulnerable Road User Safety in Urban Streets Using LiDAR and Crossing Warning System. Presenter: Joyoung Lee, NJIT

POSTER SESSION Room: 116/117

2:10 - 2:30 p.m.

INFRASTRUCTURE Room: Auditorium | Moderator: Shane Mott, Rutgers CAIT
Sustainability and Resilience Infrastructure Systems.
Presenter: Indira Prasad, Stevens Institute of Technology

SUSTAINABILITY Room: 213 | Moderator: Omid Sarmad, Rutgers CAIT
Towards Use of Stabilized New York Harbor Sediments as a Sustainable Alternative to Traditional Infrastructure Materials: A Laboratory and Numerical Study. Presenter: Tyler Oathes, Rutgers University

SAFETY Room: 214/215 | Moderator: Ryan Stiesi, Rutgers CAIT
Improving Emergency Response Time Through Dynamic Traffic Event Recognition: A Data-Driven Model Leveraging Waze Alerts. Presenter: Dejan Besenski, NJIT

POSTER SESSION Room: 116/117

2:40 - 3:00 p.m.

INFRASTRUCTURE Room: Auditorium | Moderator: Shane Mott, Rutgers CAIT
Cost-Effective Pavement Management System for Municipalities in New Jersey.
Presenters: Surya Teja Swarna, and Yusuf Mehta, Rowan University

SUSTAINABILITY Room: 213 | Moderator: Omid Sarmad, Rutgers CAIT
Life-cycle Assessment of Ultra-High-Performance Concrete (UHPC) Beams Using Advanced Monitoring Technologies. Presenter: Fatemeh Mohammadi Ghahsareh, Stevens Institute of Technology

SAFETY Room: 214/215 | Moderator: Ryan Stiesi, Rutgers CAIT
Developing a Pedestrian-Scale Lighting Resource to Improve Safety for Vulnerable Road Users.
Presenter: Ruqaya Alfaris and Greg Woltman, Rowan University

POSTER SESSION Room: 116/117

POSTER SESSION — Posters on Display

Room: 116/117

- Effect of Aggregate Properties on Abrasion Resistance of Airfield Pavements
- Construction of Full-Depth Porous Asphalt Pavement Sections for High-Traffic Volume Roadways- An Accelerated Pavement Test Case Study in New Jersey
- Optimizing Pavement Data Collection and Management Strategies: Insights from NJDOT Implementation
- Impact of Fiber Reinforcement on the Performance of Asphalt Mixtures: Insights from Laboratory and Full-Scale Testing
- Implementing Electrically Conductive Concrete Pavement: A Full-Scale Trial in Fairbanks, Alaska
- Utilizing 100% Recycled Asphalt Material (RAP) in Microsurfacing for Enhanced Pavement Performance
- The Performance of Microencapsulated Phase Change Materials in Asphalt Binder at Different Ageing levels across Variable Temperature Range
- Traffic crash severity prediction using synthesized crash description narratives and large language model (LLM)
- Investigating Mechanical Responses of Cold In-Place Recycled Asphalt Pavement Sections Under Accelerated Truck Loading by Finite Element Modeling
- Artificial Intelligence Aided Railroad Grade-Crossing Vehicular Stop on Track Detection and Case Studies
- Integrating AI to Mitigate Climate Change in Transportation Infrastructure
- Performance Evaluation of Full-Depth Reclamation and Cold In-Place Recycling Asphalt Mixtures at Varying Amounts of Bituminous and Cementitious Additives
- Assessment of Box Culvert Reinforcement Using Ground Penetrating Radar: A Case Study of NJDOT Structures
- Assessment of the Performance of Low-Carbon Concrete Solutions in Rigid Pavements Using Optimized Supplementary Cementitious Materials
- Determining the Effectiveness of Commercial Vehicle Safety Alerts
- Review of Concrete Structure Demolition Technologies
- Impact of Bio-Softening Agents on Rheological Performance of Asphalt Binders
- Electrically Cured Concrete: A Review of Material Properties, Technological Innovations, and Practical Applications
- Web-based Live and Intelligent Traffic Flow Monitoring System with a remote Unmanned Aerial System (UAS)
- Systemic and Systematic Approaches to Enhancing Pedestrian and Bicyclist Safety
- Influence of Polyethylene Melting Characteristics on Performance of Plastic Modified Asphalt Mixtures
- Utilization of Environmental Product Declarations (EPDs) and Life Cycle Assessment (LCA) to Promote Sustainability in New Jersey's Pavements
- Safety, Equity, and Sustainability: Exploring Green Energy Jobs

About Our Presenters

Eric Powers, Assistant Commissioner of Statewide Planning, Safety and Capital Investment, New Jersey Department of Transportation

Eric joined the Department in 2001 as a Transportation Planner in the Division of Statewide Planning serving as project manager for the State's first Statewide Freight Transportation Plan. From 2008 to 2011 he worked directly for the Assistant Commissioner of Planning. In 2011, he returned to the Division of Statewide Planning to lead the MPO Liaison unit.

He was promoted to Section Chief in the Bureau of Trucking services 2013 and in 2014 he joined the Division of Capital Investment Planning and Development as the Manager of the Bureau of Capital Program Coordination. He was promoted to Director of Capital Investment and Program Coordination in 2017 and served in that capacity until being appointed to the position of Assistant Commissioner of Statewide Planning, Safety and Capital Investment in October of 2023.

Eric earned a BS in Economics with a concentration in Public Sector Finance from Florida State University and a Master's degree in City and Regional Planning from Rutgers University. He is a licensed Professional Planner in the State of New Jersey and is certified by the American Institute of Certified Planners. He is a graduate of the NJDOT Succession Planning Program and a Certified Public Manager.

Francis K. O'Connor, Commissioner, New Jersey Department of Transportation

Francis (Fran) O'Connor was confirmed as the 20th Commissioner of the New Jersey Department of Transportation on Friday, June 28, 2024. He was nominated by Governor Murphy in January 2024 and began serving as Acting Commissioner on February 12, 2024.

Fran returns to New Jersey State service with over 40 years of public and private sector transportation experience. He began his public service career at the New Jersey Turnpike Authority as a toll collector and rose to be the Deputy Director of the NJTA's Electronic Toll Collection Program. In that role he launched the Authority's first electronic toll collection installation.

While in the private sector, Fran advised transportation agencies across the country on the development and execution of critical projects with a strategic focus on toll roads. In this work, Fran has overseen hundreds of employees at a time, implemented large-scale customer service centers, and engaged with regulatory entities at all levels of government. He graduated *summa cum laude* with a bachelor's in accounting from St. Peter's University.

Sutapa Bandyopadhyay, Planning and Program Development Manager, Federal Highway Administration - New Jersey Division

Sutapa Bandyopadhyay is the Planning and Program Development Manager at FHWA's New Jersey Division Office since 2019. She is responsible for leading a team of four transportation professionals who oversees a wide range of programs including statewide and metropolitan planning, environment, research, right-of-way, freight, asset management, performance-based planning and programming, complete streets, bike-ped and highway information system. Some of her other responsibilities include discretionary grant application review and development of FHWA workshop and training materials.

Prior to working at FHWA, Sutapa worked as a Principal Planner at the North Jersey Transportation Planning Authority. She is a Certified Planner of American Planning Association (APA). She has a Ph.D. from University of Denver.

Jim Tymon, Executive Director, American Association of State Highway and Transportation Officials

Jim Tymon is the Executive Director of the American Association of State Highway and Transportation Officials (AASHTO), a non-profit, non-partisan association that supports and represents the interests and missions of state departments of transportation, providing improved quality of life through leadership in transportation.

As AASHTO Executive Director, Tymon oversees a staff of 130 professionals who support their members in connecting America with the transportation system of today and tomorrow. AASHTO is now in its second century of service to state departments of transportation and their highly skilled employees. Prior to his appointment, Tymon was AASHTO's Chief Operating Officer and the Director of Policy and Management from 2013 to 2018, working closely with state DOTs in the development of AASHTO's transportation policy positions and overseeing the monitoring of legislative, administrative, and regulatory activities relating to transportation. As AASHTO's COO, Jim also oversaw the management of the Association's internal operations.



Tymon previously served as the staff director of the Highways and Transit Subcommittee of the House Transportation and Infrastructure Committee. As staff director, Tymon managed the subcommittee responsible for writing legislation for the Federal Highway Administration, the Federal Transit Administration, the National Highway Traffic Safety Administration, and the Federal Motor Carrier Safety Administration.

Jim was the Committee's lead staffer for the development of MAP-21 -- the surface transportation bill signed into law in 2012 and SAFETEA LU -- the surface transportation bill signed into law in 2005. And, Tymon served in the Office of Management and Budget, where he worked as the program examiner responsible for overseeing the Federal Highway Administration and the Federal Motor Carrier Safety Administration.

Tymon graduated from the University of Delaware with a Bachelor of Arts degree in Economics and Political Science, along with a Master of Arts degree in Public Policy. A native of New Jersey, Tymon and his family reside in Silver Spring, Maryland.

David Maruca, Program Development Administrator, Rutgers Center for Advanced Infrastructure and Transportation

David Maruca is a Program Developer for Rutgers Center for Advance Infrastructure and Transportation (CAIT) since 2013. Dave is responsible for developing, coordinating and administering several CAIT transportation safety programs.

Prior to joining CAIT, he was an enlisted member of the New Jersey State Police where he served in many different capacities to include an Academy Instructor and Unit Head of both Construction and the Motor Coach Compliance Safety Audit Review Unit. Dave ultimately achieved the rank of Lieutenant before retiring from the Transportation Safety Bureau after 27 years of service. Mr. Maruca holds a master's degree in education from Seton Hall University.

Alex Borovskis, Director, Division of Construction and Materials, New Jersey Department of Transportation
Alex Borovskis is an NJDOT SES Director, leading the Division of Construction and Materials with a staff of approximately 700 employees and 200 consultants. His division includes three Regional Construction units, the Bureau of Construction Management, and the Bureau of Materials. He oversees a construction program valued at \$5 billion and is responsible for 250 projects throughout the state.

Following in the footsteps of his father Anatolijs (Tony) Borovskis, Alex became a career employee at NJDOT when hired right out of college as a Civil Engineer Trainee in the North Region's Bureau of Construction and Materials. Serving as a field inspector and as a Resident Engineer, his contributions on multiple Route 287 projects were instrumental to the completion of this major interstate highway. Serving in a supervisory role as a Field Manager, Alex's considerable

leadership skills and construction field experience paved the way for his current managerial role of Regional Construction Engineer.

A graduate of the New Jersey Institute of Technology (NJIT) with a Bachelor of Science degree in Civil Engineering, Alex also holds a Bachelor of Liberal Arts degree from Upsala College.

Robert Blight, Executive Manager, Pavement and Drainage Management and Technology Bureau, New Jersey Department of Transportation

Robert graduated from Rutgers University in 1996 with a Bachelor of Science in Civil Engineering. He began his career in 1996 in the private sector as an engineer in training working in the field of construction inspection, materials testing, and geotechnical engineering.

He started with the New Jersey Department of Transportation in September 2000 as a Civil Engineer Trainee in geotechnical engineering and pavement design where he worked his way up to Principal Engineer. He transitioned to a Project Engineer position in the Bureau of Materials in 2009. He was selected for the position of Supervising Engineer in the Pavement Design & Technology unit in 2012 where he was responsible for evaluating and designing the annual pavement program for the department.

In 2021 he was appointed to executive manager of the Bureau of Pavement & Drainage Management & Technology where he manages the Pavement, Drainage, and Guide Rail management teams and the Pavement Design & Technology team. His Bureau is responsible for developing the annual pavement, drainage, and guide rail programs for the department, as well as designing and assisting with the execution and delivery of the paving program which averages approximately \$320 million in roadway improvements annually over the last 10 years, including the largest paving program on record at \$469 million in state fiscal year 2024.

Robert has been involved in many process improvements including the NJDOT Standard Specifications, Standard Construction Details, development of the Limited Scope Delivery process, the NJDOT Pavement Support Program, Pavement & Materials Engineering Services agreements, Pavement Project Development process, Pavement Evaluation & Design process and many of the current pavement treatments and technologies utilized by the Department. He has coauthored some (TRB) papers.

He has served on the board of directors and the technical committee for NJSAT, the NJ Asphalt Paving Conference committee, FHWA Pavement Preservation Technical Feedback Group, NCHRP panels, and served as chair of the board of directors for the NEPPP.

Krishna Tripathi, Project Management Specialist 3, New Jersey Department of Transportation

Krishna Tripathi is a Project Manager at NJDOT. She holds Bachelor of Science degree in Civil Engineering and has over 15 years of professional experience at NJDOT. She has a wide range of experience in managing and performing design for the Maintenance of Roadway Resurfacing projects as well as Safety and Betterment projects at the Bureau of Operation Support & Engineering.

Currently, she is a Project Management Specialist with the Division of Project Management (Team B), managing over 15 transportation infrastructure improvement projects in various phases, including concept development, preliminary engineering, final design, and construction. Capital Projects range from limited scope resurfacing projects to major bridge replacements and highway safety & operational improvements as well as Electric Vehicle Infrastructure Development.

Mohab Hussein, Supervising Engineer, Bureau of Structural Design & Geotechnical Engineering, New Jersey Department of Transportation

Dr. Mohab Hussein is an accomplished engineer background in transportation planning, design, and construction management. Currently, he is the State Geotechnical Engineer at the New Jersey Department of Transportation (NJDOT), where he has overseen more than 275 transportation projects totaling over \$5.4 billion. His expertise spans bridge rehabilitation, roadway widening, railroads, tunnels, dams, culverts, and sign structures.

He is the New Jersey Governor's Office representative on the Technical Standards Committee for the Gateway Program and Hudson Tunnel Project. He works with key stakeholders, including Amtrak and the Port Authority, Gateway Development Commission, FTA, and FRA. He is licensed Professional Engineer in NJ, NY, and DC. Dr. Hussein is also a certified Design-Build Professional and Project Management Professional. He played a key role in developing NJDOT's Geotechnical Resource Program, promoting sustainable practices, and optimizing resources. Dr. Hussein's pioneering research in biochar-enhanced concrete represents a groundbreaking advancement in sustainable construction materials.

Sushant A. Darji, Principal Engineer, Planning- Air Quality Unit, Statewide Planning Division, New Jersey Department of Transportation

Sushant A. Darji has served as the Principal Engineer in the Statewide Planning division of the Air Quality Unit at the New Jersey Department of Transportation (NJDOT) since 2017. He holds a master's degree from the Indian Institute of Technology Bombay, where he graduated in 2017. Specializing in transportation system planning, Sushant is actively involved in

implementing the Carbon Reduction Plan and managing the Congestion Mitigation and Air Quality (CMAQ) program. His work focuses on developing sustainable transportation strategies that reduce carbon emissions and improve air quality across New Jersey. Sushant is committed to leveraging federal funding to support innovative initiatives that enhance the efficiency and sustainability of the state's transportation system.

Giri Ventikeela, Innovation Officer, Bureau of Research, Innovation & Information Transfer, New Jersey Department of Transportation

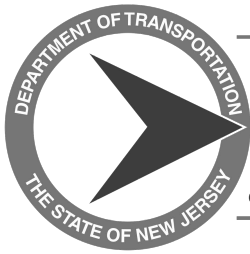
Dr. Giri Venkateela is the Innovation Officer at NJDOT BRIIT, where he manages a variety of research and innovation project and programs. He is also the NJDOT transportation pooled fund program manager and the lead for NJDOT LCTM grant program. With over 14 years of experience in transportation research and innovation, he has a strong background in both research execution and administration. Dr. Venkateela serves as a chair and member of various NCHRP research projects and participates in several TRB and AASHTO standing committees.

He is also a reviewer and judge for research proposals and journals from USDOT, NCHRP, ASCE, and TRB. He has published numerous journal articles and delivered many invited talks. Currently, he is the vice-chair for AASHTO RAC-Region 1 and the TRB-RIIM Emerging Topics Committee. Dr. Venkateela holds a Ph.D. in Civil Engineering from the University of Louisville, KY, and has served as a research scholar at Northwestern University and Rutgers University.

Pragna Shah, Acting Manager, Bureau of Research, Innovation and Information Transfer, New Jersey Department of Transportation

Pragna Shah has over 20 years of experience at NJDOT. She has managed numerous state and federal programs while serving in the Division of Local Aid & Economic Development and the Bureau of Research, Innovation & Information Transfer. She has been instrumental in implementing and overseeing various programs and research projects.

As the project manager for the Annual Research Showcase, the Bureau was recognized for the 2023 Best Virtual Event Award from the AASHTO Communications Committee. In addition to her role at NJDOT, Pragna is a member of the AASHTO Research Advisory Committee (RAC), the Transportation Research Board (TRB) Research Innovation Implementation Management (RIIM) committee, and the AASHTO Knowledge Management Committee. She holds a B.S. in Electrical Engineering from the New Jersey Institute of Technology.



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26TH ANNUAL NJDOT RESEARCH SHOWCASE PARTNERS

Cambridge Systematics, Inc.

New Jersey Institute of Technology

Thomas Edison State University

Stockton University

Rowan University

Rutgers, The State University of New Jersey

The College of New Jersey

Please visit the NJDOT Technology Transfer website and the New Jersey State Transportation Innovation Council page.

<https://www.njdottechtransfer.net/>

<https://www.njdottechtransfer.net/nj-stic/>



The 26th Annual NJDOT Research Showcase is organized and sponsored by the NJDOT Bureau of Research, Innovation & Information Transfer in partnership with the New Jersey Local Technical Assistance Program (NJ LTAP) at Rutgers Center for Advanced Infrastructure and Transportation (CAIT) and co-sponsored by the Federal Highway Administration.



** To confirm the acceptance of these PDHs for continuing professional competency for licensed professional engineers, please consult the licensure board of that state.